



# CoHemis...update

Overcoming through cooperation

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University of Puerto Rico at Mayagüez (UPRM)

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## CoHemis facilitates course in Uruguay

### Nitrogen Fixation Module

On July, 1999, the Foundation for Microbiology approved an \$18,000 grant for a Nitrogen Fixation Education Module for Uruguay. The two-year proposal was submitted by Dr. Salvador Curbelo, a professor at Uruguay's Universidad La República, a CoHemis Consortium member. The course's main resource will be Dr. Eduardo Schroder, from the UPRM Faculty of Agricultural Sciences. As required by the Foundation, CoHemis will administer the funds as a free contribution to the project.

The 4-week course will be taught to undergraduate students the first year, and to graduate students in the second. It will alternate theory and laboratory experiences with visits to the inoculant industry and agriculture research centers. The project will invite other experts to contribute. Dr. Schroder has previously collaborated with Argentinian Consortium member Universidad Nacional de Río Cuarto.

## CoHEMIS DELIVERS NEW COLLABORATIONS AND RENEWS OLD CONTACTS IN CENTRAL AMERICA

*In the Office of the Chancellor of Guatemala's University of San Carlos, CoHemis' codirectors Dr. Jorge Vélez-Arocho and Dr. Luis Pumarada-O'Neill receive USC pins from Chancellor Efraín Medina and Dean of Engineering Herbeth Miranda-Barrios. San Carlos was founded in 1676 by a decree of Spain's Charles II.*



The co-directors of the CoHemis Center, Drs. Luis Pumarada-O'Neill and Jorge I. Vélez-Arocho, along with Dr. Jorge Rivera-Santos, Interim Dean of the School of Engineering of the University of Puerto Rico at Mayagüez (UPRM) and Director of the Puerto

Rico Water Resources and Environmental Research Institute, traveled to Central America in mid July, 1999. Drs. Pumarada and Vélez visited Guatemala at the beginning of the trip, while Vélez continued along to Costa Rica and El Salvador with the company of Dr. Rivera.

### Guatemala

Doctors Pumarada and Vélez visited Guatemala City on July 12-13, 1999. The purposes of this trip were: to collaborate with the Rafael Landívar University (RLU) at the request of its Vice-chancellor for Academics, to visit the University

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## CoHemis facilitates remote sensing project Agreement and collaboration for bio-optic application with Argentinean institute

The University of Puerto Rico at Mayagüez (UPRM) and the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP), from Mar del Plata, Argentina, have signed an agreement to facilitate joint research activities. This agreement was arranged by the Center for Hemispherical Cooperation in Research and Education in Engineering and Applied Science (CoHemis), which has been designated by UPRM Chancellor, Dr. Zulma Toro, to manage the

UPRM side of its implementation.

The first collaborative effort between UPRM and INIDEP is already underway. During November 2-13, 1999, Drs. Roy Armstrong and Fernando Gilbes, from the UPRM Marine Sciences Department, traveled to Argentina to participate in an oceanographic research cruise. This collaboration is very important for the development of the Argentinean remote sensing program. Its National Commission for Space

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Flood Zone Mapping course in D.R.

## UPRM and INTEC join in developing Dominican human resources for flood zone mapping

The Technological Institute of Santo Domingo (INTEC), a most active member of the CoHemis Consortium, is offering a specialization program in drawing flood zone maps with the collaboration of UPRM faculty. Its Dean of Engineering, Daniel Comarazamy, and its Department of Continued Education have organized this program which is expected to mitigate the effects of natural disasters. Drs. Jorge Rivera-Santos, Rafael Segarra-García, and Walter Silva-Araya, together with Prof. Linda Vélez, all from UPRM's Department of Civil Engineering, are conducting this important course. The module is composed of two theory-practice cycles, one on Hydrologic Modelling and another on Hydraulic Modelling, with applications to a Dominican watershed case-study.

The course schedule is:

October, 5-8: Statistical Methods in Hydrology.

October, 26-28: Hydrologic Analysis using HEC-HMS software.

November 16-19: Hydraulic Analysis of rivers using HEC-RAS.

To be offered soon: Use of Geographic Information Systems for flood zone mapping.

According to Eng. Alfredo Abel-Francisco, the program's coordinator, this course is targeted for professionals in the areas of hydrology, hydraulics, sanitary engineering, environmental sciences, and agronomy. The program's objective is to develop local human resources for the elaboration of maps of areas prone to flooding by rivers, which is usual during the hurricane season. The purpose of these maps is to contribute to regulating urban and rural growth minimizing risks to lives and property.

## UPRM participates in Cuban joint research cruise

The Cuban boat *Ulises*, of 2,149 tons and 253 feet long, hosted researchers from Canada, United States, Mexico, Cuba and Puerto Rico in a historic collaborative oceanographic cruise last March. Doctors Fernando Gilbes and José M. López and doctoral candidate Angel Dieppa, all from the Department of Marine Sciences of the University of Puerto Rico at Mayagüez (UPRM), participated in this event.

The *Ulises* traveled through American, Cuban and Mexican waters to study the patterns of sea currents. By studying the currents in that area, scientists can understand better the dispersion patterns of microscopic surface organisms, called phytoplankton, in the waters of the Gulf of Mexico. In addition, the trip compiled

information on the optical properties of the ocean surface. That information will be used to develop mathematical equations to calibrate and validate remote sensing data from space satellites to estimate concentrations of phytoplankton.

This oceanographic cruise also hopes to shed some light on the "red tides" of Florida. These phenomena, thus called by the red-brown color they produce in the surface of the water, are created by a high accumulation of toxic phytoplankton. Until now, scientists have not been able to predict where or when they will appear. The toxins that they produce affect the central nervous system of many fish. In addition, they can affect humans, specially those who

suffer from chronic or severe respiratory conditions.

The UPR's Mayagüez Campus feels honored that its investigators have participated in a mission so important both at a scientific level and for international relations.

## SPANISH TEXT ON SYMBOLIC LOGIC PUBLISHED

Dr. Rosa F. Martínez-Cruzado, a distinguished Professor of Ethics and currently Associate Dean of Academic Affairs at UPRM, has published the college textbook *Fundamentos de Lógica Simbólica - el cálculo de deducción natural* (Fundamental Symbolic Logic-Calculus of Natural Deduction).

Dr. Martínez has a Ph.D. from Frankfurt University. In 1991-92 she was a Visiting Professor at Michigan State University.

The book has a clear and pleasant style. Starting from language (Spanish), it passes into symbolic logic as an artificial language for analyzing the validity of arguments. It includes more than 600 exercises with different levels of difficulty. A solutions manual is available.

For a demonstration copy, contact:  
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## Business incubator approved for UPRM

Puerto Rico's Industrial Development Company (PRIDCO) approved a proposal from the University of Puerto Rico at Mayagüez for the creation of a high technology industrial incubator. The proposal, presented by Electrical and Computer Engineering Professor Rafael Fernández Sein, received a grant of \$1.2 million for a five year term. The two institutions signed an agreement early in 1999 to implement the initiative.

The business incubator, called ViTeC for its Spanish acronym, is a program designed to incubate high technology companies that present a potential for economic development for Puerto Rico. In addition, it will promote the development of innovative technologies that would support manufacturing or help to export Puerto Rican professional services.

For the development of ViTeC, PRIDCO provided a building which will be used by UPRM to provide resources and support to the incubating companies. The companies can be formed by UPRM students and/or professors or individuals not related to the University.

One of the main obstacles faced by investigators, scientists and inventors everywhere is obtaining economic support once they discover or invent some process or product. ViTeC hopes to overcome that by providing the basic, essential resources, such as water, electricity, telephone and space, at low cost. UPRM will also offer expertise in technical matters as well as in management, human resources, and marketing, among others.

At present, several companies are interested in participating in the program. Among these are Technico Company, which has several patents in refrigeration, and Caribbean Pictometry, a company dedicated to the processing and analysis of satellite images. Some of the student projects developed in UPRM's School of Engineering such as solar vehicles, solar air conditioner and gadgets for the disabled, could perhaps now reach their entrepreneurial potential thanks to ViTeC.

## Successful course on the Brazilian software SPRING for Caribbean islands

*The participants and organizers of the course on the SPRING GIS software. IAI's Dr. Eduardo Banus is second from the left; INPE's Marissa da Motta is second to his right with dark glasses. The islands of the Caribbean Sea were represented by nine persons, mostly college-level GIS instructors or coming from doctoral programs.*



Continuing with the recommendations of the Conference-Workshop on the Caribbean Countries of the Inter American Global Change Research Program (IAI), organized by CoHemis in 1997, the IAI, offered a training course on the use of the geographic information system (GIS) denominated "SPRING". This system is the outcome of a great scientific and technical effort of the Instituto Nacional de Pesquisas Espaciais of Brazil (INPE), which has donated this GIS in several versions to the IAI member countries.

The course, part of the IAI project for developing the institutional capacity IAI of countries, was held on February 23-27, 1999 at UPRM thanks to the efforts of the CoHemis Center. UPRM's Prof. Carmen V. Santiago and Dr. Fernando Gilbes were the course coordinators for CoHemis.

A training course for candidates from the Caribbean was organized to take advantage of this acutely needed product. The course took place in the INCADEL computer laboratory of the UPRM Department of Electrical and Computer Engineering. The IAI/GEF Project assumed the costs of transfer, travel allowance and contract of INPE specialist Marisa Da Motta. CoHemis contacted the Caribbean institutions and partially covered the expenses of the selected participants through a contribution obtained from the UPRM Sea Grant Program. The course was developed in English, but it is available in Spanish and Portuguese. The success of the course

was evident. The participants' institutions can download from the Internet all the copies needed of the SPRING software and they now have the trained human resources to use it.

The workshops intended to explain geoprocessing technology. It is hoped that in a near future IAI and INPE can repeat and expand these seminars to specialized GIS subjects, since the modules of GIS- SPRING are as varied as their applications. Access to the complete product is free for all except profit-seeking companies, as has been established by INPE.

Puerto Rico and other Caribbean Islands were represented by nine persons, almost all of them involved with PhD programs or lecturing on GIS at Universities. The training course used software tools available in the Spring-3.2 environment. Theoretic foundations and examples of actual GIS applications were discussed in order to demonstrate and illustrate the potential of geoprocessing in spatial analysis applications to geosciences, environment modeling, urban planning and natural resource management.

The participants came from the University of Virgin Islands; the St. Croix Department of Public Works; Barbados' Caribbean Meteorological Institute; the UPR-Río Piedras Department of Geography; the UPRM Department of Agricultural Engineering; the University of West Indies, Trinidad; and Université Quisqueya, Haiti. The last two belong to the Cohemis Consortium.

## Central America...

of San Carlos, and to establish contacts in the United States Embassy and with the Guatemalan National Science and Technology Council (CONCYT) that could help future collaborations.

The all day meeting at RLU held on the twelfth of July was intended to discuss ideas related to the renovation of engineering curricula and to define possible future collaborations from UPRM to help accomplish the same objective. On behalf of the Jesuit RLU, the following officials from the Faculty of Engineering participated: Jorge Lavarreda, Dean; Federico Salazar, Vice Dean; Vicente Chávez, Director of Chemical Engineering; Rodolfo Guerra, Director of Mechanical Engineering; José Carlos Gil, Director of Civil Engineering; and Mario Sosa, Director of Informatics Systems and Engineering. Furthermore, the Academic Vice-Chancellor, Father Charles Beirne, S. J., assisted the meeting for a short time.

The following issues were discussed:

- Reducing the number of credits and years in each engineering career;
- Ideas about changes and flexibility in the curricula;
- Promoting faculty research;
- Creating and operating a research center in RLU;
- Actualizing the engineering faculty;
- Establishing courses and laboratories in electronic engineering;
- Training professors that could participate in the Project Management of the Basin of Usumacinta River, jointly with the Mexican South Frontier University;
- Training professors on how to use geographic information and systems and satellite images;
- Improving educational technology.

As a continuation of what was discussed in the meeting, several RLU officials would travel to Puerto Rico in November. They would assist to a conference on engineering education, Frontiers in Education 99, and visit UPRM to meet with the Dean of Engineering and the department directors and visit laboratories.

### USIS

In the afternoon, while Dr. Vélez remained in the above meeting, Dr. Pumarada excused himself to meet Mr. Peter Samson, Cultural Attaché ascribed to the USIS in the United States Embassy.

Mr. Samson confirmed that his agency could cover the expenses of trips that dealt with environmental and non-technical matters. In Samson's opinion, the University of Puerto Rico should be used more frequently in the relations between the United States and Latin America.

### USAID

The co-directors of CoHemis met with Ms. Wende DuFlon, from the Health and Education Office of USAID on July 13, 1999. After the principal projects and programs belonging to CoHemis and USAID had been mutually presented, a common interest arose on the possibility of having ethnic Mayans from Guatemala, who receive education grants from USAID, to study in the University of Puerto Rico those undergraduate or graduate careers that are not available in Guatemala.

### University of San Carlos

Later that same morning, a meeting took place in the University of San Carlos (USC) with the Chancellor and the Dean of Engineering, respectively Agr. Eng. Efraín Medina and Eng. Herbeth Miranda. The Chancellor showed great interest in making USC a member of the CoHemis Consortium, and he made clear his intention of initiating the necessary steps. In addition, it was mentioned that it would be desirable to extend the international joint project organized by CoHemis and Sandia National Laboratories on water security (See page 9.) to the Villalobos River, a tributary of Lake Amatitlán, a very important hydrologic resource for Guatemala. At the end of the meeting, the Dean toured the engineering laboratories with his guests, the co-directors of CoHemis. Dean Miranda, who presides the Executive Board of the Engineering Network of Central America, expressed his interest in establishing collaboration with UPRM in connection with the networks project on homogenizing the engineering curricula of Central America.

### CONCYT

That afternoon, Pumarada and Vélez visited CONCYT and met with its Executive Secretary, Ms. Magali Morales. Ms. Morales also showed interest in joining the Consortium, which already has CONCYT's counterparts in Perú and Bolivia as members. Consequently, CONCYT could facilitate and even help to support collaborations among UPR and other members of the Consortium with

Guatemalan institutions. Ms. Morales emphasized that CONCYT is willing to help the universities of Guatemala on joint curriculum revisions.

### Costa Rica

On Thursday, July 15, 1999, Dr. Vélez, together now with Dr. Rivera-Santos, visited the University of Costa Rica (UCR), which is member of the CoHemis Consortium, responding to an invitation made by its School of Geology.

That morning, Dr. Vélez-Arocho conducted a workshop on the "hierarchical analytical process", the mathematical methodology used to prioritize the issues in the Vital Issues Process. The workshop was offered by Dr. Vélez in response to a request made to him on a prior visit to Costa Rica on April, 1999. Twenty-five participants assisted the workshop, including professors and students. They received a demonstration of the method that has been used in managing the projects dealing with the watersheds of rivers in Puerto Rico, Michigan and Costa Rica. (See page 9.)

During their visit to UCR, Drs. Vélez and Rivera met with Teresa Aguilar, Director of the School of Geology, Eng. Carlos Sánchez, Director of the Civil Engineering Department, and Dean of Engineering Dr. Fernando Silenski. In the meeting with Ms. Aguilar, one of the topics discussed was strengthening the UCR program on the management of hydrologic resources using faculty from UPRM. Another topic mentioned was the possibility of joint research with geology professors from Mayagüez on the interesting karst region of Puerto Rico.

In another meeting, Dr. Jorge Rivera-Santos handed Eng. Sánchez a preliminary draft of a joint proposal between UCR and UPRM. The topic of this particular proposal was to construct a computer simulation of the drainage of the runoff water of the city of San José. They also discussed the desirability of having a researcher from the Puerto Rico Water Resources and Environmental Research Institute offer a course at UCR. The course, about the use of simulation models of water systems, would be at a professional level. Also discussed was the development of a graduate program on Environmental Engineering using remote courses originating at UPRM.

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# The University of Puerto Rico - Mayagüez contributes to the post-hurricane reconstruction of Honduras

An interdisciplinary group formed by personnel from the University of Puerto Rico at Mayagüez aims to provide assistance to the processes of reconstruction after hurricane Mitch in Honduras. The National Oceanographic and Atmospheric Administration of the United States (NOAA) commissioned this project to the Sea Grant Program of the University of Puerto Rico. Dr. Manuel Valdez Pizzini, of the UPRM Department of Social Sciences heads this program. Mr. Ruperto Chaparro, associate director of the program, leads

the project. It searches for better reconstruction strategies and aims to recommend ways of reducing the effects of future natural disasters. The project will focus in transferring information and technology as part of a larger effort to potentiate the capacity of the coastal communities of Honduras.

A small interdisciplinary group of researchers from UPRM visited Honduras in April 14-22, 1999 to assess the situation and the position of the government leaders and the community. In addition to Chaparro, the group included Dr.

Havidán Rodríguez, one of the main Latin American experts on the social aspects of situations of natural disasters; marine geologist Kurt Grove; fishery specialist Edgardo Ojeda; and physical oceanographer Aurelio Mercado. The UPRM's interdisciplinary group includes other experts besides the ones that traveled in April. These include Dr. Luis Pumarada, Director of CoHemis, who has a Ph.D. in Urban System and Policy Planning.

Based in the recommendations of the visiting group, the full project is expected to initiate in the year 2000.

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The meeting with Dean Fernando Silenski focused on the support that he could offer to the initiative from the Civil Engineering Department. The dean promised to keep in touch with matters related to the issue. Moreover, Silenski became interested in the participation of UPRM in projects of remote sensing and geographic information systems, and in a possible joint project on sensors with INTEL of Costa Rica and UPRM professors.

On the following day, Dr. Vélez-Arocho and Dr. Rivera-Santos moved to EARTH University for a workshop on water security. (See page 9.)

## EL SALVADOR

Following Costa Rica, Vélez-Arocho and Rivera-Santos launched a productive visit to San Salvador, El Salvador, upon the invitation of Eng. Mario Freddy Hernández, President of the Superior Education Council of El Salvador. That visit was the first to that country by CoHemis, and it took place on July 19 and 20.

### General Meeting

On Monday, July 19, Vélez and Rivera met in the facilities of the Salvadorean Association of Engineers and Architects (ASIA) with representatives of public and private universities, as well as with officials from professional associations and representatives from the Ministry of Education. The meeting opened with a presentation by Eng. Hernández, whose objective was to re-

quest discussion on mechanisms of collaboration between UPRM and the institutions present in the meeting. He suggested that these collaborations should deal with the following:

- Improvement in the quality of education in Salvadorean universities;
- Cooperation between the universities and the professional association to improve the education of professors and professionals;
- Curricular revisions, especially for engineering programs; and
- Joint research.

Subsequently, Dr. Rivera-Santos delivered a presentation on the UPRM School of Engineering, emphasizing aspects such as organizational structure, curricula, important research fields, and projects on curricular innovation and institutional improvement. Next, Dr. Vélez-Arocho presented the initiatives presently under development by the CoHemis Center.

Following these initial presentations, a joint session took place with the following objectives:

- Examine areas of interest and need in



View of the participants in the meeting at Rafael Landívar University. Dean José Lavarreda is at the center, with CoHemis' codirectors standing to his right.

the universities and professional associations;

Identify short run initiatives that are able to address these needs;

Propose mechanisms of integration and collaboration among the universities and professional associations present.

Those discussions resulted in the following conclusions:

Form a permanent task force that consists of the institutions and the professional associations present under the coordination of Eng. Mario Freddy Hernández;

Organize a workshop on curricular innovation and renovation which presents a method to revise the present curricula and proposes changes re-

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sponding to the present conditions of El Salvador and to new trends in higher education;

Organize a workshop on curricular uniformization and on the accreditation of engineering programs; and

Form task forces to develop collaborative projects on environment, management of watersheds, and continued education. Regarding watersheds, it was proposed to begin with a seminar.

### Ministry of Education

On that same day, doctors Vélez and Rivera, along with Eng. Hernández, met in the Ministry of Education with Mr. Adalberto Elías Campos, National Director of Higher Education. The objective of the meeting was to obtain the support of Vice-Minister Rolando Marín in relation to the initiatives proposed in the meeting held that morning. They also discussed possible funding sources for the workshops on curricular innovation and uniformization of engineering curricula.

### University of El Salvador

On Tuesday, July 20, the visitors and Eng. Hernández met with Dr. José Benjamín López-Guillén, Chancellor of the University of El Salvador (UES), Eng. Francisco Marroquín, Dean of the School of Mathematics and Natural Sciences, and with Mr. Francisco Chicos, Director of the Department of Biology. The purpose of this meeting was to explore the possibility of a collaboration between the UES and UPRM. The meeting enlisted the Chancellor's cooperation for both initiatives established in the meeting that took place on the previous day: management of the environment and management of watersheds. Furthermore, they discussed the possible collaboration of UPRM in the evaluation of a proposal by the UES to develop a Masters program in Environmental and Natural Resources in the Department of Biology of the School of Mathematics and Natural Sciences. In addition, it was agreed to carry out the necessary steps for the membership of UES in the CoHemis Consortium. The membership in the Consortium would provide the framework in which initiatives between UES and UPRM would develop.

## International Symposium on Metal Ions and Trace Elements vs. Health and Environment

The 6<sup>th</sup> International Symposium on Metal Ions in Biology and Medicine will be held on May 7-10, 2000 at San Juan, Puerto Rico. The main objective of this symposium is to foster the exchange of opinions among professionals and specialists working in the analysis, research and applications of metals, trace elements and minerals in biological, biochemical, and medical sciences, as well as in environmental health. The scientific program, consisting of plenary and concurrent sessions, poster presentations, and panel discussions, is designed to promote intensive and productive dialogue among experts in these fields. Short courses have also been organized, featuring specialized areas such as toxicology, analysis, and environmental health.

The scientific program is organized according to traditional areas in biology, medicine, and environmental health. The following topics are examples of the intended breadth of the Symposium:

- Metals and Environmental Health
- Speciation of Metals and other Elements
- Uses of Metals in Clinical Applications
- Epidemiology and Occupational Health
- Metals and Disease: Environmental and Toxicological Pathology
- Health Effects of Arsenic
- Metals and Aging
- Metals and Homeostasis
- Effects of Low and High Nutritional Trace Elements Intake
- Risk Assessment of Trace Element Status and Health
- Toxicity of Metals
- Metals and Hormone Receptors
- Metals and Chelation Therapy
- Metals and Enzyme Activity
- Advanced Methods for the Analysis of Trace Elements and Metal Ions

The objectives of the Symposium are: Promote the exchange and dissemination of scientific knowledge about trace elements and metal ions and their role in biological processes and in the etiology of diseases, including cardiovascular diseases, diabetes, and

cancer.

Explore new advances, applications and uses of metal ions on medical research areas, including: clinical applications, aging, nutrition, and cancer prevention.

Discuss new technological developments on the analysis of trace elements and metal ions.

Foster discussion on environmental and public health research needs.

The Symposium is intended to bring together:

Medical scientists, health professionals, toxicologists, pharmacologists, and

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## Ethics in Engineering, Science and Business

The NSF-sponsored Ethics Initiative which is organized by the CoHemis Center at the University of Puerto Rico at Mayagüez is approaching its completion. The work produced so far is available at <http://ece.uprm.edu/cohemis/etica>. The project included the following activities during the Fall semester:

1. Integration of ethical issues into courses, such as addition of ethics modules to syllabi, test questions, discussion exercises, discussion of cases, and presentations to special groups.

2. Production of the final version of the Case Booklet, which includes 45 cases from the fields of business, science, agriculture, and engineering. Its Appendix presents materials for integrating utilitarianism, learning stages, rights-duties approach, and various practical suggestions for generating and teaching case studies. The project includes the translation into English of the booklet and its distribution. The Spanish version will be available to interested parties in Spanish-speaking America.

3. A retreat in December 10-13 at Hotel Hacienda Juanita, focused on integration activities, such as: case presentation and analysis, how to teach and access cases, the assessment of the cases in the case booklet, and suggestions on new cases and on changes to the existing cases. About twentytwo faculty members from Engineering, Science and Business participated.

## LATIN AMERICAN STUDENTS AT UPRM:

# From the Mayagüez Sugar Mill to the Mayagüez Campus

In every issue, *CoHemis...update* interviews one of the hundreds of Latin American UPRM graduate students in engineering or sciences.

In the Colombian city of Palmira, of the Valle del Cauca Department, there is a sugar mill called Mayagüez. This name is probably four decades old, from when the sugar industry in Puerto Rico was in decline while the vallecaucana one was growing rapidly. Around that time, about five sugar mills were disassembled in Puerto Rico to be installed in Colombia.

Consequently, the name Mayagüez was not foreign to Palmira's engineer/professor Juan Carlos Herrera-Sánchez when, last year, a friend informed him how well his studies were proceeding in the University of Puerto Rico's, Mayagüez Campus, and invited him to join him there. At that time, Herrera-Sánchez was working as a contractor, paving roadways in the city of Palmira and, occasionally, doing structural design. He had obtained his B.S. in 1988 in Structural Civil Engineering from Cali's renowned Universidad del Valle. He was still working part time in that university, offering courses in applied mechanics.

Although he enjoyed his vocational engagements, Juan Carlos was fascinated with the idea of acquiring a doctorate in the United States in order to return to Cali as a professor and at the same time run his own engineer's office. When his friend told him that he could possibly obtain a financial aid from UPRM, acquire an M.S., and later apply for a doctorate in any prestigious American university, Herrera, single and with some savings, did not take long to make a decision. UPRM was the university within the American higher education system where he would not have to rack his brain for months in anticipation to improve his English. He was delighted to know that many other Latin American students had already accomplished, with great success, precisely what he was planning to do while polishing their English concurrently with their engineering studies.

As of today, Herrera is in the process of finishing his second semester in Mayagüez. He pays his studies through a teaching assistantship that covers his educational and living expenses. For this aid, he offers a course, Statistics for Civil Engineers.

Next semester, his aid will be covered by a project run by Dr. Luis Suárez, his thesis mentor, who is a specialist in dynamic responses of structures. His thesis will be centered on the seismic study of a structure consisting of cables, columns and a hanging platform, part of the famous Cornell-NSF Radio Observatory in Arecibo, Puerto Rico. Herrera has already initiated the literary review for the thesis, from which Suárez hopes to obtain more than one publication with the help of his Colombian student. Dr.



Suárez, originally from Jujuy, Argentina, and with a doctorate from Virginia Polytechnic, is one of the most distinguished engineering professors in Puerto Rico, due to the quality in his teaching and to his numerous, excellent publications.

The Arecibo Radio Observatory is the largest in the world. Its enormous parabolic antenna is built within a limestone depression above an underground river. Hanging above its center, pending from three cables secured by steel towers, there is a metallic structure equipped with expensive and complex electronic equipment. This structure is unique, for which it does not benefit from building codes to guarantee its protection and that of the equipment which it contains. Its seismic analysis is a problem of great academic interest and, at the same time, of great material importance due to Puerto Rico's high seismic risk.

Working in the seismic field will be a good experience for Herrera and his plans to return to Cali to teach and conduct private practice, since the Cauca Valley,

as well as other Colombian regions, are high risk seismic zones. The young man is very satisfied with the opportunity to work for Dr. Suárez. He is pleased that professors at UPRM are able to dedicate more time to their graduate students due to the limited number of students in the graduate level. Furthermore, he is content that the size and lifestyle of Mayagüez are to his advantage in terms of a suitable study environment. On the other hand, he considers that UPRM's library hours are not sufficient to support the needs of a graduate student. He also complains about the warm weather in Mayagüez, considering the fact that he comes from a cool region.

Even though his friend did not return to UPRM this year because he is working in Colombia on his thesis, Herrera has found that the university has a good number of other Colombians in graduate study. For a Colombian who paid his own graduate studies, the costs of UPRM would not differ much from those of the most prestigious Colombian universities. However, the cost of living in Puerto Rico is much higher due to the devaluation in the Colombian peso. Almost all of Herrera's fellow Colombian students are also receiving assistantships. A few are supported by agencies of the Colombian government for which they work. A majority of these Colombians study sciences; perhaps due to the fact that there is more funding available in this field than in engineering.

Herrera noted that the majority of the UPRM Colombian students seem to come from the Valle del Cauca and, like him, have come thanks to friends who are studying or who have graduated from UPRM. He speculates that the cause of this student connection with Mayagüez originated decades ago, when vallecaucanos came to Mayagüez to pursue careers related to agriculture and the sugar industry. He also thinks that the taste of vallecaucanos for "salsa" music, greatly associated with Puerto Rico, permits the young generation from his region to find a familiar atmosphere in the Latin-Caribbean island. And, of course, for those from Palmira, with its Mayagüez sugar mill, the university feels even more familiar.

## “Frontiers in Education 1999” in Puerto Rico

The annual Frontiers in Education conference was held this year in San Juan, Puerto Rico on November 10-13 at the Condado Plaza Hotel and Casino. The theme for this important science and engineering education innovations conference was: “Engineers Designing the Future by Incorporating Diversity, Innovation and Advanced Technology into the Educational Process”.

FIE is organized by the Education Research Methods Division of the American Society of Engineering Education, the Education Society of IECE, and the Computer Society of IEEE. Dr. Dan Budny, from Purdue University, was the General Chair of the conference. Dr. Ramón Vásquez, Director of the Research and Development Center of the University of Puerto Rico at Mayagüez, chaired the Local Organizing Committee. The CoHemis Center participated in the Local Organizing Committee and also announced the event within the CoHemis Consortium and through its other Latin America and Caribbean contacts.

The conference featured peer-reviewed papers, work-in-progress reports, and workshops on a variety of innovative approaches to science and engineering education. Topics included: accreditation issues, active-cooperative learning, assessment issues, advanced technologies in the classroom, capstone and multidisciplinary design experiences, creativity and innovation, creative design experiences, integrated curricula, international initiatives and programs, K-12 initiatives-increasing the pool, core curricula, retention issues, software applications, software engineering, education, undergraduate research experiences, virtual university, writing and communications, world wide web applications, women and minorities in engineering, ethics and social issues, electrical and computer engineering, and engineering technology.

Raytheon Corporation sponsored a well-liked visit to the Cornell-NSF Arecibo National Astronomy and Ionosphere Center on Thursday, November

## Dr. Zulma R. Toro-Ramos, an Industrial Engineering Ph.D.: UPRM’s new Chancellor

In June, 1999 the governing board of the University of Puerto Rico designated Dr. Zulma Toro-Ramos as Chancellor of the UPR’s Mayagüez Campus, Puerto Rico’s Land Grant University. A professor of Industrial Engineering at UPRM, Ms. Toro-Ramos is the first woman to be appointed Chancellor in the almost nine decades of Campus history. Dr. Toro-Ramos has been linked with UPRM first as a student and later on as part of the faculty.

Doctor Toro obtained her B.S. in Industrial Engineering from UPRM in 1982. Subsequently, she received a master’s degree from the University of Michigan. She completed her Ph.D. in 1988 at the Georgia Institute of Technology, in the area of Industrial Engineering and Systems.

She returned to UPRM in 1988 as a faculty member. In addition, she has contributed to several Puerto Rican industrial firms as consultant in the design and operations of manufacturing systems through analytical modules and ergonomics.

Her administrative experience includes serving as Director of the Department of Industrial Engineering, Associate Dean of Academic Affairs for Graduate Studies, and Interim Dean of the Engineering College.

Her experience as a researcher includes publications related to ergonomics, her area of expertise. Doctor Zulma R. Toro participated in the education and manufacturing committees which recommended on the implementation of the official Science and Technology Policy of the government of Puerto Rico.

11. This site visit included a tour of the facility and a workshop entitled “Utilization of State-of-the-art Wireless LAN Technology for Design Teams Working at a Distance”

FIE-99 sponsored a Graduate Student College Fair for the purpose of recruiting minority students into graduate work. Fifty universities participated in this fair.

For additional information, please contact the FIE 99 Home Page at: <http://fairway.ecn.purdue.edu/~fie/fie99/>.



### UPR SIGNS AGREEMENT WITH “UNIVERSITY FOR PEACE”

The Río Piedras Campus of the University of Puerto Rico signed a five year collaborative agreement with the University for Peace (UPAZ), an institution founded in 1980 by the United Nations. Both universities confirmed their commitment to contribute to the improvement of research, education, and service to peace. UPAZ is an international institution dedicated to search for the supreme good of peace by means of an education with a humanist commitment. It follows the postulates of the United Nations Act, the Universal Declaration of the Human Rights, and its own Constituent Letter. It has his seat in Colón, Costa Rica.

The agreement was signed by Dr. Jorge L. Sánchez as interim Chancellor of the Río Piedras Campus and doctor Francisco Barahona as Chancellor of UPAZ. Doctor Barahona offered during a recent visit to Puerto Rico a keynote lecture for the Faculty of General Studies of the Río Piedras Campus. The document, signed during this visit, established that UPAZ and the Río Piedras Campus will promote innovation and institutional development. It stimulates joint collaboration in the development of research, graduate studies, and service programs. It will also facilitate exchanges of faculty and graduate students.

## CoHemis Water Security Workshops develop watershed management strategies

Thanks to the contacts and facilitation provided by the CoHemis Center, UPRM, Michigan State University (MSU), Costa Rica's Escuela de Agricultura de la Región Tropical Húmeda (EARTH), and Sandia National Laboratories (SNL) have conducted parallel series of interdisciplinary and multiple perspective panels of water resource stakeholders to guide the development of watershed management strategies. The participating stakeholders come from government, industry, citizens' groups, and academia. The main objective of this joint effort is to



V.I.P. workshop participants get ready for a tour of Puerto Rico's Río Grande de Añasco basin

develop plans and robust planning processes to assure "water security": protect quality, manage distribution and treatment, and ensure an adequate supply.

Three demonstration watersheds that can be used as long-term research sites have been used: Puerto Rico's Río Grande de Añasco, Costa Rica's Río Dos Novillos, and Michigan's Red Cedar River. These watersheds are located within different climate, land use, economic and cultural contexts, and face different versions of the same problems.

### Puerto Rico

UPRM, through its Puerto Rico Water Resource and Environmental Research Institute and the support of the US Environmental Protection Agency, has created an interdisciplinary partnership to develop and implement a comprehensive integrated management plan for the Mayagüez Bay watershed, which includes the Río Grande de Añasco basin. This project seeks to develop:

1. A comprehensive, integrated management plan for the Mayagüez Bay watershed that permits the restoration, conservation and protection of the quantity and quality of its natural resources, establishing a balance between human uses and ecological integrity;

2. Strategies to restore and protect the water resources and to control the significant pollutant sources within the watershed; and

3. An implementation and monitoring plan that guarantees that the above plan and strategies perform as intended.

The implementation of the plan should allow the optimum utilization of the resources within limits that ensure the integrity of the ecosystems and improve

the quality of life for all inhabitants of the Bay's watershed.

In the first stage of the project, consisting of a series of three panels, the participating stakeholders identified the following vital issues for the Río Grande de Añasco basin:

- Medium and long term monitoring plan
- Effective geographical limits and point and non-point sources of pollution.

- Historical, physical, natural, and socio-economical study and an estimation of future trends, including the characterization of the current uses.

- Development of an educational and community relations program for the dissemination of information.

- An analysis of the expected consequences of possible changes in parameters, including taking no action.

- Evaluation of the natural capacity of the systems to recover naturally after pollution is stopped, and possible interventions needed for full recovery.

- Identification of the important natural and cultural resources in the basin.

- An integrated data bank that serves the different interests of the stakeholders.

- Revision and analysis of data gathered by stakeholders, and determination of the need for new studies relevant to the development of the Plan.

### Costa Rica

EARTH developed its project based on the above experience of Puerto Rico. The criteria for selecting the Río Dos Novillos basin were: location in the very humid tropics; closeness to EARTH College; diversity in land uses, including urban, and in size of production units; and availability of preliminary information. People in the humid

tropics assign a low value to water as a resource. In fact, water is so plentiful that it is often classified as a problem. Nevertheless, as basins become more accessible and intensely used and populated, the damage to water resources through pollution, excess artificial drainage of land for agricultural use, erosion, and deforestation increases.

In order to assign proper value to water resources and to assure water security, there is a need to establish criteria to evaluate water resource management in the humid tropic region. To establish and weigh criteria and to identify and prioritize critical regions there must be precise, current data on the quality and quantity of available water resources and on current upstream and downstream uses, such as human consumption, recreation, and food production. In identifying uses, it is essential to recognize wildlife and natural ecosystems as legitimate water users that need to be protected for their integrity.

### Michigan

MSU, through its Department of Resource Development and its Center for Latin American and Caribbean Studies, conducted a vital issues workshop parallel to the development of the other two projects. The goal of MSU was to learn what are the major water management issues in the Red Cedar watershed from the stakeholders' perspective. The objective of the workshop was to identify, define, prioritize, and discuss how to solve the major water problems facing the people that live, work, or have vested interests in the basin. The stakeholders identified the following vital issues:

- Zoning regulations
- Lack of public awareness/understanding
- Concentration on jurisdictional instead of natural boundaries
- Economic conflicts among land uses
- Lack of funding
- Difficulties in altering people's behavior
- Lack of long-term planning
- Problems perceived as personal rather than relational
- Lack of a shared vision of the watershed by the different stakeholders
- Lack of information on watershed
- Lack of effective communication.

## UPRM offers ISO 14000 Seminars

The ISO 14000 Standards aim to make environmental management a top priority in participating companies. They will guide companies to manage, measure, improve, and communicate the environmental aspects of the operation in a systematic manner.

The standards cover: design, manufacture, and marketing of products; selection of raw materials; the types of environmental information that is collected; and how this information is communicated internally, to governments, and to the public. More specifically, the standards cover environmental management systems, environmental performance evaluation, environmental labeling and marketing, and life cycle assessment. Companies that are certified under the standards may win a partial respite from government policing of their operations. Seminars on this subject typically address additional topics such as:

- Risk Assessment and Management
- Proactive Environmental Management
- ISO 14000 and its parts
- ISO 14001 Certification
- Product Evaluation

If your institution is interested in sponsoring a seminar in this area, please contact Dr. Iván Baigés through CoHemis.

### Metal ions ...

other scientists interested in the effects of metal ions, trace elements, and minerals on human and environmental health.

Environmental and industrial scientists, epidemiologists, geo-scientists, and ecologists.

Biochemists, biologists, and chemists. Microbiologists, geneticists, molecular biologists, and cell biologists.

Dr. José A. Centeno, senior researcher from the Armed Forces Institute of Pathology, is the General Chair of this event. For more information, please visit the internet home page: <http://www.afip.org>.

# AN INTERAMERICAN PARTNERSHIP FOR HEALTH AND HEALTH PROMOTION

The Interamerican Partnership of Universities and Education Centers for Health and Health Promotion constitutes a network of institutions dedicated to developing human resources for health and health promotion. It aims to strengthen bonds, cooperation, solidarity, collaboration, and academic exchanges between its members. It is an active forum of discussion on existing plans of study for the formation of education personnel for health and health promotion, and a promoter of joint actions directed to stimulate and improve the theoretical, methodological, and practical development of education and research in this field in the Americas.

This partnership offers a forum for the exchange of experiences and knowledge among countries, favoring alliances, the development of learning projects, and mutual support. Created in 1996 in San Juan, Puerto Rico under the Panamerican Organization of the Health and the School of Public Health of the Medical Sciences Campus of the University of Puerto Rico, it is integrated by the following institutions:

- Universidad Nacional de Córdoba, Argentina
- Universidad Nacional de Santiago del Estero, Argentina
- Universidad Nacional de La Plata, Argentina
- Universidad de São Paulo, Brasil
- Escola Nacional de Salud Pública, Brasil
- Universidad Federal de Río de Janeiro, Brasil
- University of Montreal, Canada
- University of Laval, Canada
- Direction of Public Health of Montreal-Centre, Canada
- University of Toronto, Canada
- Universidad de Los Lagos, Chile
- Universidad de Chile
- Universidad Católica de Chile
- Universidad del Valle, Colombia
- Universidad de Antioquía, Colombia
- Acción Cultural Popular, Colombia
- Universidad Javeriana, Colombia
- Escuela Nacional de Salud Pública, Cuba
- Departamento de Salud Escolar, Cuba
- Centro Nacional de Promoción y Educación para la Salud, Cuba
- Escuela Andaluza de Salud Pública, España
- American University, United States
- University of New Mexico, United States
- Universidad Autónoma Metropolitana de Xochimilco, México
- Universidad de Panamá
- Universidad de Puerto Rico
- Comisión Honoraria de Lucha Contra el Cáncer, Uruguay

The Third General Assembly of the Partnership is programmed for the year 2000. In this activity the initiatives of academic exchange among the institutions that comprise the Partnership will be evaluated. The partnership's coordinating office is located at the Department of Social Sciences, Graduate School of Public Health, Medical Sciences Campus, University of Puerto Rico. For more information, please contact Dr. Hiram Arroyo, Coordinator, PO Box 365067, San Juan, Puerto Rico 00936-5067. E-mail: [h\\_arroyo@rcmaca.upr.clu.edu](mailto:h_arroyo@rcmaca.upr.clu.edu).

**UPRM-INIDEP...**

Activities (CONAE) is supporting the project.

The purpose of the cruise was to calibrate the satellite sensor called SeaWiFS (Sea-viewing Wide Field-of-view Sensor) for deriving reliable estimates of the amounts of chlorophyll in these waters. The UPRM investigators contributed their expertise and the optical instrumentation, while CONAE provided the satellite imagery of the area. The cruise started and ended in Mar del Plata after covering 800 nautical miles in six days on board of Capitán Canepa, a 125-foot research vessel. The collected measurements provide the first water bio-optical database for this region. This information is presently being used to validate existing SeaWiFS algorithms and to create more robust remote sensing algorithms for this important and highly dynamic area. Improved satellite information will be used by INIDEP for their



*View of  
the  
research  
vessel  
Capitán  
Canepa*

resource management programs. Drs. Armstrong and Gilbes presented preliminary cruise results from to the director and staff of CONAE on the afternoon of November 13 in Buenos Aires.

For more information on this project and other research programs of the UPRM Bio-Optical Oceanography Laboratory, please visit:

<http://cacique.uprm.edu/biol>

## SHORT NEWS

### CoHemis collaborates in the organization of “NAFSA 2001”

The convention for the year 2001 of Region VII of the National Association of International Educators, known for its abbreviation as NAFSA, will take place in San Juan, Puerto Rico. CoHemis is part of the local organizing committee. Its conventions, dedicated to the international education, are separated by regions. Puerto Rico belongs to its Region VII. The topics to be discussed are such as: exchange of students and professors, recruitment techniques, international education ethics, and communication in a multicultural world. The representative from NAFSA in Puerto Rico is Mr. Eduardo Rey, from the Puerro Rico State Department. Mr. Rey has conducted presentations to the members of NAFSA about the CoHemis Center and its Consortium.

### Plans for UPRM-UCR student and professor exchanges

An exchange program involving students and professors between UPRM and the University of Costa Rica (UCR) in the environmental field has been proposed after a visit to UCR by the Puerto Rico Water Resources and Environmental Research Institute and the CoHemis Center. It was proposed that UPRM and UCR recruit interested students and professors, and assign them undergraduate research projects. In exchanging professors, the visiting professor would conduct a workshop on a topic related to his environmental research. The students involved would take courses and conduct an undergraduate research project in the university which they are visiting.

### INTEC faculty meet with UPRM colleagues

Eng. Alfredo Abel-Francisco and Prof. Catherine Cattafesta, both from the Institute of Technology of Santo Domingo (INTEC), met in February, 1999 with doctors Havidán Rodríguez, Jaime Gutiérrez-Sánchez, Walter Díaz and Prof. Luisa Seijo- Maldonado, all from the UPRM Department of Social Sciences. The meeting took place in the UPRM Applied Social Science Research Center. Its main objective was to explore the possibility of developing collaborative bonds between both institutions in order to facilitate research on mitigation and management of natural disasters.

### Fruitful University of Kentucky visit to UPRM

Dr. Eric Anderson Grulke, director of the Department of Chemical Engineering and Materials of the University of Kentucky (UK), visited UPRM on February 17 and 18, 1999 for a series of meetings and presentations. His visit was coordinated by CoHemis upon the request of the President of the University of Puerto Rico. As a result of this meeting, several students from UPRM participated in the internship program of this university this past summer. The program, run by the University of Kentucky, covered all of their expenses and granted each student \$2,730.